DRAFT Enterprise Infrastructure Solutions (EIS)
Request for Proposals

Section C
Description / Specifications / Statement of Work

Voice Extract:

Internet Protocol Voice Service and Circuit Switched Voice Service

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C.1 Background

C.2 Technical Requirements

C.2.1 Data Services

C.2.2 Voice Services

The technical requirements for Voice Service (VS) are provided in Sections C.2.2.1 and C.2.2.2.

VS can be provided using various technologies. The pricing tables have been organized as follows:

1. Internet Protocol Voice Service
2. Circuit Switched Voice Service

The contractor shall provide at least one of the VS technologies specified above as its mandatory VS solution. The contractor may propose to provide both forms of VS.

C.2.2.1 Internet Protocol Voice Service

Internet Protocol Voice Service (IPVS) provides voice communications service and telephony features to agencies using VoIP over a managed IP network.

C.2.2.1.1 Service Description

IPVS shall provide a network-based (hosted) and premises-based telephone service over the contractor-provided IP network. The contractor shall also provide a Managed LAN Service (see C.2.2.1.5) and Session Initiation Protocol (SIP) Trunking Service (see C.2.2.1.6).

C.2.2.1.1.1 Functional Definition

IPVS supports voice calls, whether initiated from on-net locations or from off-net locations, to be connected to all on-net and off-net locations by direct station-to-station dialing.

C.2.2.1.1.2 Standards

IPVS shall comply with the following standards:

1. ITU-T G.711.
2. ITU-T G.723.x (Optional), G.726 (Optional), G.728 (Optional), or G.729.x (Optional).
3. ITU-T H.323, H.350.

4. Real-Time Transport Protocol (RTP) IETF RFC 3550.
5. Session Initiation Protocol (SIP) IETF RFC 3261.

C.2.2.1.1.3 Connectivity

IPVS shall connect to and interoperate with:

1. PSTN, including both wireline and wireless networks, in domestic and non-domestic locations.
2. All other EIS contractors' voice service networks.
3. Satellite based voice networks.

C.2.2.1.1.4 Technical Capabilities

The IPVS shall include unlimited on-net to on-net and on-net to CONUS off-net calling. The IPVS shall support off-net calling to CONUS, OCONUS, and Non-Domestic locations. The contractor shall provide capabilities that enable IPVS subscribers to successfully establish and receive telephone calls between both on-net locations and the PSTN.

The contractor shall provide a remote access capability that, once enabled, provides users with the ability to use any landline or cell phone to make or receive phone calls as if they were making or receiving calls with their VoIP phones.

The contractor shall provide the following minimum capabilities:

1. Real time transport of voice, facsimile, and TTY communications.
2. Real time delivery of caller ID (ANI) information (when provided from the originating party).
3. Interoperate with public network dial plans (North American Numbering Plan) and Direct Inward Dialing (DID) service.
4. Interoperate with private network dial plans and support direct station to station dialing.
5. Interoperate with non-commercial, agency-specific 700 numbers.
6. Provide access to public directory and operator assistance services.
7. Provide the capability to identify the originating number of a caller, on a per call basis, and dial back to the originating number (call return).
8. Support multi-point conferencing.

The contractor shall provide gateways for interoperability between the contractor's IP-based network and the PSTN, or with agency UNI's. The specific gateway will depend

upon the subscribing agencies UNI requirements. The gateways and functionality are described below:

1. Subscriber Gateway – The contractor shall provide interoperability for non-IP telephone devices. The contractor shall provide non- proprietary telephony station UNI's including (a) analog station and (b) ISDN BRI station interfaces.
2. PSTN Gateway – The contractor shall provide transparent access to and interwork with the domestic and non-domestic PSTNs.

The contractor shall provide the capability to support station mobility. Station mobility enables IP subscribers to dynamically move their IP phones within the agency's enterprise wide network and access IP services.

The contractor's IPVS shall have the capability to traverse and successfully interoperate with agency firewalls and security layers. The contractor shall verify with the agency that the agency firewall is compatible with the contractor's service.

The contractor shall ensure that security practices and safeguards are provided to minimize susceptibility to security issues and prevent unauthorized access. This includes SIP-specific gateway security for SIP firewalls, where applicable. The contractor shall ensure that security practices and policies are regularly updated and audited. The general areas of security to be addressed are:

1. Denial of service – The contractor shall provide safeguards to prevent hackers, worms, or viruses from denying legitimate IPVS users and subscribers from accessing IPVS.
2. Intrusion – The contractor shall provide safeguards to mitigate attempts to illegitimately use IPVS.
3. Invasion of Privacy – The contractor shall ensure that IPVS is private and that unauthorized third parties cannot eavesdrop or intercept IPVS communication numbers and IP addresses or URLs.

The contractor shall fully comply with emergency service requirements, including 911 and E911 services, and identify the location of originating stations and route them to the appropriate Public Safety Answering Point (PSAP).

The contractor's IPVS shall comply with the Federal Communications Commission (FCC) Local Number Portability (LNP) requirements.

The following capabilities shall be included:

1. Caller ID.
2. Conference Calling.
3. Do Not Disturb.
4. Call Forward – All.

5. Call Park.
6. Hotline.
7. Call Forward – Busy.
8. Call Pickup.
9. Hunt Groups.
10. Call Forward – Don't Answer.
11. Class of Service Restriction.
12. Multi-Line Appearance.
13. Call Hold.
14. Distinctive Ringing.
15. Directory.
16. Call Transfer.
17. Call Waiting.
18. Speed Dial.
19. Call Number Suppression.
20. Specific Call Rejection.
21. Last Number Dialed.
22. IP Telephony Manager (Administrator).
23. IP Telephony Manager (Subscriber).

C.2.2.1.2 Features

The following IPVS features are mandatory unless marked optional:

ID Number	Name of Feature	Description
1	Voice Mail Box	The contractor shall offer voice mail capability that includes voice messaging transmission, reception, and storage for 24x7 except for periodic scheduled maintenance. The contractor provided voice mailbox shall meet the following *minimum* requirements: 1. At least sixty minutes of storage time (or 30 messages) 2. Ability to remotely access voice mail services 3. Secure access to voice mail via a password or PIN 4. Automatic notification when a message is received 5. Minimum message length of two minutes

ID Number	Name of Feature	Description
		6. Capability to record custom voice mail greetings This capability can be administered on a station basis according to the subscribing agency's needs The contractor shall send an email with a WAVE (.wav) file attachment of each voicemail message received by subscribers of this feature to the email address that the subscriber designates. The contractor shall provide users the capability to add additional notification devices / email addresses or update email information and email preferences when receiving and forwarding messages through a secure user web portal.
2	Auto Attendant	Auto Attendant allows callers to be automatically transferred to an extension without the intervention of an operator. The contractor shall provide capabilities allowing callers to dial a single number for high volume call areas and to select from up to nine (9) options to be directed to various attendant positions, external phone numbers, mailboxes or to dial by name or extension at a minimum.
3	Three-way conference calling	Allows a station user to establish a multiparty conference connection of up to three conferees including themselves.
4 (optional)	Augmented 911/E911 Service	The contractor shall appropriately populate a 911 Private Switch/Automatic Location Identification (PS/ALI) database with the government's profile which shall include all the subscribers' telephone numbers, station locations, building location, building address, building floor, and room number) during service implementation.The contractor shall provide a secure remote access to the government via a client or a web browser to allow the government to maintain the government's profile on an ongoing basis (e.g., to account for moves, adds, deletions, or other changes). The contractor shall ensure these government profile updates are reflected in the PS/ALI database.

C.2.2.1.3 Interfaces

The UNIs at the SDP are mandatory unless marked optional:

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling Type
1	Router or LAN Ethernet port: RJ-45	Up to 100 Mbps	SIP (IETF RFC 3261), H.323, MGCP, or

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling Type
	(Std: IEEE 802.3)		SCCP

C.2.2.1.4 Performance Metrics

The performance levels and AQL of KPIs for IPVS are mandatory.

Key Performance Indicator (KPI)	Service Level	Performance Standard (Threshold)	Acceptable Quality Level (AQL)	How Measured
Latency	Routine	200 ms	≤ 200 ms	See Note 1
Grade of Service (Packet Loss)	Routine	0.4%	≤ 0.4%	See Note 2
Availability	Routine	99.6%	≥ 99.6%	See Note 3
	Critical	99.9%	≥ 99.9%	
Jitter	Routine	10 ms	≤ 10 ms	See Note 4
Voice Quality	Routine	Mean Opinion Score (MOS) of 4.0	MOS ≥ 4.0	See Note 5
Time to Restore	Without Dispatch	4 hours	≤ 4 hours	See Note 6
	With Dispatch	8 hours	≤ 8 hours	

Notes:

1. Latency is the average round trip time for a packet to travel from source SDP to destination SDP. This applies to CONUS.
2. Grade of Service (Packet Loss) is defined as the percentages of packets that are sent by the source SDP but never arrive at the destination SDP (the percentage of packets that are dropped). The packet loss can be measured with an ICMP test. This applies to CONUS.
3. Availability is measured end-to-end and calculated as a percentage of the total reporting interval time that the IPVS is operationally available to the Agency. Availability is computed by the standard formula:

$$Availability = \frac{RI(HR) - COT(HR)}{RI(HR)} \times 100$$

4. Jitter is the average variation or difference in the delay between received packets of an IP packet data stream from SDP to SDP. Relevant standard: IETF RFC 1889. This applies to CONUS.
5. As defined in ITU-T specification P.800 series.
6. See Section G.8.2.1.2 for definition and how to measure

C.2.2.1.5 Managed LAN Service

The contractor shall provide a Managed LAN Service. The contractor shall provide and manage all LAN networking hardware components (e.g. layer 2 switching devices, routers, switches, call servers, etc.) to extend the IPVS from the site demarcation point to the terminating subscriber device (e.g., handset); including the management of the router that terminates the IPVS access arrangement. Equipment provided by the contractor shall support Power over Ethernet (PoE) in order to supply necessary power to IP phone sets or other PoE devices. IPVS service is a pre-requisite for Managed LAN Service.

The contractor shall provide, manage, maintain and repair or replace all equipment necessary to provide the Managed LAN Service, except for those portions of the service for which the government is responsible (e.g., power, facilities, rack space, cabling/wiring).

The contractor shall provide the technical capabilities of the Managed LAN service as specified below:

1. The contractor shall provide all of the hardware and licensing necessary to extend the IPVS site demarcation point to the terminating device (e.g., the handset), be it a hosted or premises based solution. In the case of an on-premises solution this would include any hardware or licensing necessary to support on-premises call processing (e.g., call manager, IP PBX etc.).
2. The contractor's hardware/software solution shall interoperate with the subscribing agency's provided VoIP ready cabling infrastructure including category 5, 5E, 6, 6A and single mode and multimode fiber at a minimum. The contractor shall identify any cabling limitations with regards to either form of VoIP solution in its proposal.
3. The contractor shall be responsible for the ongoing maintenance and upgrades of the contractor-owned equipment used to provide the Managed LAN Service. If the contractor replaces, makes any changes to the contractor's equipment, device software, or reprograms subscriber devices, in order to meet the required service performance level, the government will not incur any additional cost.
4. The contractor shall propose installation time intervals for additional subscriber devices at sites already using a Managed LAN Service.

5. The Managed LAN Service shall not include any wireless devices or components on the LAN (i.e., wired solution only) unless requested and approved by the government.
6. The Managed LAN Service shall not support other services (i.e., data, video etc.) unless requested and approved by the government.
7. The contractor shall ensure that only authorized subscriber devices are able to operate on the Managed LAN Service. Authorized subscriber devices will be determined by the subscribing agency.
8. The contractor shall monitor, manage and restore the Managed LAN Service on a 24x7 basis.
9. The contractor shall specify the LAN management activities being provided as part of the Managed LAN Service as well as identify those activities which are considered customer responsibilities in the following areas:
    a) Configuration management.
    b) Moves, Adds, Changes, Disconnects (MACDs).
    c) Service/Alarm monitoring and fault management.
    d) Ticket creation.
    e) Proactive notification.
    f) Trouble isolation and resolution.
10. The contractor shall provide proactive notification of major and minor alarms to the Managed LAN Service via e-mail to the Points of Contact (POCs) identified by the subscribing agency. Alarm notifications shall be sent to all identified POCs within 15 minutes of alarm detection by the contractor.
11. The contractor shall define the escalation path for trouble tickets for both network and hardware issues. This escalation path shall be identified by level of severity and include key personnel for each level of escalation as well as guidelines and timing for the next step in escalation.

C.2.2.1.6 Session Initiating Protocol Trunk Service

Session Initiation Protocol (SIP) Trunk Service provides a SIP-based IP Trunk service that interoperates with any Private Branch Exchange (PBX) systems that support SIP-based Trunk interfaces.

SIP Trunk Service provides a direct IP connection between a SIP-enabled PBX system on an agency's premises and the contractor's SIP-compliant IPVS network. SIP trunking shall be fully integrated with IPVS to support callings to on-net and off-net locations. The network and the management of the network will be provided by the underlying network service.

C.2.2.1.6.1 Technical Capabilities

The contractor shall provide capabilities that will enable SIP subscribers to successfully establish and receive telephone calls between both on-net locations and the PSTN.

C.2.2.1.6.2 Features

The following SIP Trunk Service features are mandatory:

1. Automatic call routing
2. Bandwidth QOS management
3. Trunk bursting
4. Telephone number blocks (DID)

C.2.2.2 Circuit Switched Voice Service

The government has a large community of voice users throughout the US public sector and also conducts a considerable amount of business with US citizens, private sector firms, and foreign entities.

C.2.2.2.1 Service Description

C.2.2.2.1.1 Functional Definition

Circuit Switched Voice Service (CSVS) supports voice calls, whether initiated from on-net locations or from off-net locations, to be connected to all on-net and off-net locations by direct station-to-station dialing throughout the United States. The government's requirement for CSVS is functional. The contractor is required to provide the service, meet the interface specifications, and satisfy the KPIs. The government will not specify how the contractor is to provide CSVS.

C.2.2.2.1.2 Standards

The contractor shall comply with voice service industry standards.

C.2.2.2.1.3 Connectivity

CSVS shall connect to and interoperate with:

1. Government-specified terminations (such as single-line telephones, Secure Terminal Equipment, multi-line key telephone systems, conference-room audio equipment, PBX, Centrex, T1 MUX, modem, FAX, and video teleconferencing system).
2. PSTN, including both wireline and wireless networks, in domestic and non-domestic locations.

3. All other EIS contractors' voice service networks.
4. Satellite phones and terminals.

C.2.2.2.1.4 Technical Capabilities

The following Voice Services capabilities are mandatory unless marked optional:

1. Uniform numbering plan:
   a) Unique directory number for all on-net government locations, including support of existing EIS numbers.
   b) PSTN (including both wireline and wireless networks) numbers and any future changes to PSTN numbers.
   c) (Optional) Non-commercial agency-specific private 700 numbers:
      i. Transparency and interconnectivity between the contractor's network and other networks (see Section C.2.2.2.1.3).
      ii. Originating and terminating on-net calls. Incoming off-net calls from the PSTN shall be blocked unless an agency-specific request for the service gateway has been received and implemented.
2. Network intercept. Network intercept to a recorded announcement shall be provided as an inherent network capability when a call cannot be completed. At a minimum, such announcements shall be provided for the following conditions:
   a) Number disconnected (disconnected number shall not be reassigned for at least 90 days for those situations where the contractor controls number assignment).
   b) Time-out during dialing.
   c) Network congestion.
   d) Denial of access to off-net and non-US calls.
   e) Denial of access to features.
3. User-to-user signaling via ISDN D-Channel (optional). The contractor shall support user–to-user signaling, in accordance with ITU-TSS Q.931 standards, via the ISDN D-channel during a call.
4. Voice quality at least equal to 64 kbps PCM (standard: ITU G.711).
5. The contractor shall fully comply with emergency service requirements, including 911 and E911 services, and identify the locations of originating stations and route them to the appropriate Public Safety Answering Point (PSAP).

C.2.2.2.2 Features

The following CSVS features are mandatory unless marked optional:

ID Number	Name of Feature	Description
1	Agency-Recorded Message Announcements	1. Authorized government personnel shall be able to record message announcements within the network after authentication of user-ID and password/token. 2. The recording shall be assigned an on-net number and shall be accessible from on-net and off-net stations. 3. The contractor shall provide the capability of a three-minute message announcement length. 4. The length of each message provided by the government will be determined on a case-by-case basis and will continue to three minutes in length (or longer if the contractor capability exists and is provided at no additional cost to the government). 5. A call to the announcement must be answered within five rings and barge-in access to the announcement shall be permitted. 6. The contractor shall provide a system-wide capability for storing a minimum of 500 recorded messages. This feature shall enable a minimum of 250 callers concurrently to access an announcement.
2 (optional)	Authorization Codes/ Calling Cards	The contractor shall provide authorization codes. The authorization code shall support the following functionalities: 1. Caller identification and class-of-service (COS) for users to include call screening (see User's Call Screening feature) and service performance levels (see Performance Metrics for routine and critical users). At a minimum, 128 classes of service shall be available to each user, station, or trunk. 2. Same authorization code for originating on-net, off-net, and audio conference calls. 3. Use authorization code if originating station identification cannot be made by other means for billing and COS purposes. 4. Use authorization code when override capabilities are desired. 5. The COS derived from an authorization code shall take precedence over that derived from any other means. 6. When an authorization code is used for the service, it shall be verified without involving an operator before a call is

ID Number	Name of Feature	Description
		connected. 7. The contractor shall support the following capabilities as specified by the government: a. Actual requirements for calling party identification (e.g., ANI suppression). b. COS assignment. c. Types of calling cards: 1. Post-paid calling cards. (a) Charges accumulate as the card is used, and billing is based upon monthly charges. 2. Pre-paid calling cards. (a) Fixed dollar amount of $50.00 (b) Rechargeable dollar amount where amount can be renewed or increased when the initial amount balance is low or depleted d. Expiration date for pre-paid calling cards. e. Use for audio conferencing service (ACS) only. f. Agency-specific logo and no printing of GSA logo on the card. g. Suppression of call detail records (CDRs). h. Immediate cancellation of the card if reported stolen or lost by a user without incurring further charges on the card. The format of the authorization code shall be determined by the contractor and shall support/provide the following capabilities: 1. Credit card-sized authorization code card(s), also called Calling Cards, unless otherwise directed by the government. 2. Durable plastic composition and imprinted with authorization code, user's name, and organization. 3. User instructions shall be issued, as directed by the government, at no additional cost. 4. Safeguards as follows: a. Potential fraud and theft regarding issuance,

ID Number	Name of Feature	Description
		distribution, and activation of authorization codes. b. Delivery of Personal Identification Numbers (PINs) independent from delivery of the calling cards. c. Exclusion of the last 4 digits of authorization codes, i.e., PINs, in billing records. 5. If sufficient space is available, inclusion of the Federal Relay Service's "TDD/800-877-8339" number on the back of the calling card. 6. Contractor-defined dialing sequence that alerts the network when an authorization code is about to be entered so that processing of calls not requiring this feature are not delayed. 7. Temporary override of a COS restriction assigned to a caller's station. This will allow an individual user to place a call at a higher network COS for the duration of the call by entering a valid authorization code. This capability shall have the following functionalities. a. Absence of excessive delays caused by waiting for all digits to be dialed before recognizing the call as one that involves an override. b. Inclusion of all CDR relevant data charged to the authorization code rather than to the originating station. 8. Allowance of authorized users to gain access, after validation of authorization codes, to on-net voice service and features from off-net locations by dialing certain contractor-provided toll free and message unit-free (to the callers) commercial directory numbers. This capability shall have following functionalities. a. Numbers may be a local number, a Foreign Exchange number, an NANP number, or some other service type, e.g., toll free service, for which toll free and message unit-free service has been arranged for pre-designated regions. b. Toll free and message unit-free commercial directory numbers shall be printed on the back of the calling card. c. Region boundaries shall be defined by the contractor. d. Users shall be able to select, by service order, the regions of the country from which access is to be

ID Number	Name of Feature	Description
		allowed and the service type that provides the most economical service for a given application. 9. A multiple call feature that shall allow the user to dial a code (e.g., the "pound" key [#]) after a call in order to make multiple calls without re-dialing the access and card number. 10. Direct operator access to provide assistance with dialing or for providing information. 11. An error correction feature that enables cardholders to correct a dialing mistake by pressing a key, e.g., the "star" key (*) and re-enter the correct number. 12. A speed dialing option that allows cardholders to use abbreviated dial codes for frequently dialed numbers. 13. Availability of all administrative tools or management reports made available by the contractor with equivalent commercial calling card offerings.
3	Caller Identification (ID)	The contractor shall provide the calling number to the terminating stations for each incoming call.
4 4.2. (optional)	Call Screening for users	Call screening consists of a set of features that determine a call's eligibility to be completed as dialed based upon COS information associated with the user, the station, or the trunk group. The following call screening features shall be supported: 1. Class of Service (COS) and Restrictions. The contractor shall provide a minimum of 128 classes of service for each user, station, or trunk. COS shall be determined from the ANI, authorization code, traveling classmark, or trunk group. The COS derived from an authorization code shall take precedence over that derived from other means. Classes of service shall identify but not be limited to access and feature restrictions as follows: a) Access restrictions shall include but not be limited to access to toll free and 900 calls, access to off-net calling, access to other government networks, access to non-US calling, and access to other than specified NPA/NXXs. b) Feature restrictions shall allow or restrict access to network features by users or groups of users. 2. Code Block. This feature shall screen and prevent ineligible users, stations, and trunks with certain class-of-service

ID Number	Name of Feature	Description
		access restrictions from calling specified area codes, exchange codes, and countries. Blocked calls shall be intercepted to appropriate network recorded announcements.
5	Customized Network Announcement Intercept Scripts	The contractor shall implement customized network intercept announcement scripts as requested by the government. The contractor shall record the customized network announcements after obtaining government approval of scripts.
6 (optional)	Internal Agency Accounting Code	For calls involving an EIS Calling Card or originating station with a special COS, the following capabilities shall be provided: 1. Entry of additional (up to a maximum of eight) digits to identify internal agency accounting codes for the call, i.e., these accounting codes will be transferred to the CDR with no further processing. 2. CDRs shall reflect all relevant data on the call to include internal agency accounting code digits. Calls shall be charged to the authorization code rather than to the originating station.
7	Off-Net Information Calls	A user shall be able to call off-net directory assistance by dialing NPA-555-1212 or any other off-net directory assistance number. NPA also includes service access codes, e.g., 800, for this feature.
8	Suppression of Calling Number Delivery	Based on the COS of the originating station or EIS Calling Card, the contractor shall inhibit the delivery of the calling number, i.e., ANI, by setting the Privacy Indicator at the originating end and honoring it at the terminating end. In addition, it shall be possible to block calling number delivery on a call by call basis by dialing a contractor-provided code.
9	Voice Mail Box	The contractor shall offer voice mail capability that includes voice messaging transmission, reception, and storage for 24x7 except for periodic scheduled maintenance. The contractor provided voice mailbox shall meet the following *minimum* requirements: 1. At least sixty minutes of storage time (or 30 messages) 2. Ability to remotely access voice mail services 3. Secure access to voice mail via a password or PIN 4. Automatic notification when a message is received 5. Minimum message length of two minutes 6. Capability to record custom voice mail greetings This capability can be administered on a station basis according to

ID Number	Name of Feature	Description
		the subscribing agency's needs
10 (optional)	MLPP	DOD requires that the EIS CSVS provide Multilevel Precedence and Preemption (MLPP), as defined in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01C and DOD Instruction 8100.3, Department of Defense Voice Networks, to specified EIS users and on trunks connecting to the Defense Switched Network (DSN).
11	Three-way conference calling	Allows station users to establish a multiparty conference connection of up to three conferees including themselves.

C.2.2.2.3 Interfaces

The UNIs at the SDP are mandatory unless marked optional:

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling Type
1	Analog Line: Two-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Line-Loop Signaling
2	Analog Line: Four-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Line-Loop Signaling
3	Analog Trunk: Two-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Trunk-Loop Signaling (loop and ground start)
4	Analog Trunk: Four-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Trunk–Wink Start Signaling
5	Analog Trunk: Four-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Trunk-E&M Signaling
6	Digital Trunk: T1 (Std: Telcordia SR-TSV-002275 and	Up to 1.536 Mbps	T1 Robbed-Bit Signaling

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling Type
	ANSI T1.102/107/403)		
7	Digital Trunk: ISDN PRI (23B+D and 24B+0D)T Reference Point (Std: ANSI T1.607 and 610)	Up to 1.536 Mbps	ITU-TSS Q.931
8	Digital: T3 Channelized (Std: Telcordia GR-499-CORE)	Up to 43.008 Mbps	SS7, T1 Robbed-Bit Signaling
9 (Non-US)	Digital Trunk: E1 Channelized (Std: ITU-TSS G.702)	Up to 1.92 Mbps	SS7, E1 Signaling
10 (Optional)	Optical: SONET OC-1 (Std: ANSI T1.105 and 106)	49.536 Mbps	SS7
11 (Optional)	Electrical: SONET STS-1 (Std: ANSI T1.105 and 106)	49.536 Mbps	SS7
12 (Non-US)	Digital: E3 Channelized (Std: ITU-TSS G.702)	Up to 30.72 Mbps	SS7, E1 Signaling
13	Digital Line: ISDN BRI (2B+D) S and T Reference Point (Std: ANSI T1.607 and 610)	Up to 128 kbps (2x64 kbps)	ITU-TSS Q.931
14	Router or LAN Ethernet port: RJ-45 (Std: IEEE 802.3)	Up to 100 Mbps	SIP (IETF RFC 3261), H.323, MGCP, or SCCP

C.2.2.2.4 Performance Metrics

The performance levels and AQL of KPIs for CSVS are mandatory unless marked optional:

KPI	Service Level	Performance Standard (Threshold)	AQL	How Measured
Availability (POP-to-POP)	Routine	99.95%	≥ 99.95%	See Note 1
Availability (SDP-to-SDP)	Routine	99.5%	≥ 99.5%	
	Critical	99.95%	≥ 99.95%	
Time to Restore	With Dispatch	8 hours	≤ 8 hours	See Note 2
	Without Dispatch	4 hours	≤ 4 hours	
Grade of Service (Call Blockage)	Routine	0.07 (SDP-to-SDP)	≤ 0.07	See Note 3
		0.01 (POP-to-POP)	≤ 0.01	
	Critical	0.01 (SDP-to-SDP & POP-to-POP)	≤ 0.01	

Notes:

1. CSVS availability is calculated as a percentage of the total reporting interval time that the voice service is operationally available to the agency. Availability is computed by the standard formula:

$$Availability = \frac{RI(HR) - COT(HR)}{RI(HR)} \times 100$$

[Note that this KPI is waived for calls made with calling card.]

2. Refer to Section G.8.2.1.2 for definition and how to measure.
3. Grade of Service (Call Blockage) is the proportion of calls that cannot be completed during the busy hour because of limits in the call handling capacity of one or more network elements. For example, 0.01 indicates that 1 percent of the calls not being completed (1 out of 100 calls).